The glyphosate saga: an example of influence of unsound science and interest groups in public health decision making

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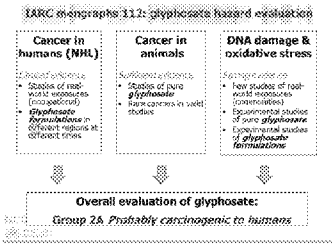
Background

The International Agency for Research on Cancer (IARC) evaluated the carcinogenic hazard of the herbicide glyphosate. It concluded that the data for glyphosate meet the criteria for classification as a probable human carcinogen (group 2A). On the other hand, the European Food Safety Authority (EFSA) and German Federal Institute for Risk Assessment (BfR) came to the conclusion that glyphosate cancerogenicity is unlikely[1]. FAO/WHO did not challenge the IARC findings but concluded that cancer risk was unlikely at typical human ingestion levels. Ongoing evaluations of glyphosate carcinogenicity by the US Environmental Protection Agency (US EPA) and the European Chemical Agency (ECHA) have both been published as drafts still under review. We summarized the methods used by different public health decision makers and their limits in terms of science, transparency and conflicts of interests.

Figure 1: Evaluation of glyphosate by IARC: evidence of its carcinogenicity in humans, animals and mechanistic models (Fig: courtesy: Kate Z. Guyton).



Public Health Decision Making Processes

IARC: IARC applied a transparent and rigorous scientific process by 17 publicly identified independent experts, and a highly professional standardized evaluation of all publically available studies[2]. The IARC Working Group found an association between NHL and glyphosate based on the available human evidence and significant carcinogenic effects in laboratory animals for rare kidney tumours and hemangiosarcoma in two mouse studies and benign tumours in two rat studies. The IARC WG summarized that there was strong evidence of genotoxicity and oxidative stress for glyphosate, entirely from publicly available research, including findings of DNA damage in the peripheral blood of exposed humans. The IARC WG concluded that there is sufficient evidence of carcinogenicity in animals, limited evidence of carcinogenicity in humans and strong evidence for two carcinogenic mechanisms.

EFSA/BfR: The EFSA/BFR evaluation of glyphosate carcinogenicity, based on the Renewal Assessment Report (RAR) for glyphosate prepared by the Rapporteur Member State (BfR), concludes that: "glyphosate is unlikely to pose a carcinogenic hazard to humans"[3]. No authors or contributors are listed for either document by BfR and EFSA[4]. The use of confidential data submitted to the BfR makes it impossible for any scientist not associated with BfR to review this conclusion. Three known experts from the chemical industry are members of the Pesticide Committee of the BfR[5].

EFSA classified the human evidence as 'very limited' and then dismissed any association of glyphosate with cancer without clear explanation or justification. Ignoring established guidelines by OECD and ECHA, cited in their report, EFSA dismissed evidence of renal tumours in three mouse studies, hemangiosarcoma in two mouse studies and malignant lymphoma in two mouse studies. Thus, EFSA incorrectly discarded all findings of glyphosate-induced cancer in animals as chance occurrences. EFSA ignored important laboratory and human mechanistic evidence.

FAO/WHO: The joint FAO/WHO meeting of pesticide residues concluded that "glyphosate is unlikely to pose a carcinogenic risk to humans from exposure through the diet". A transparent disclosure of the criteria used for assessing carcinogenic risk is missing. No reference was provided in the document. No list of authors and disclosure of conflicts of interests was provided in the document. Nevertheless, different members, including the chairman, of the joint FAO/WHO meeting of pesticide residues had been reported to have financial conflicts of interests with industry[6].

ECHA: Glyphosate classification is also currently under review by ECHA. A draft of the report by ECHA has been published for public comments[7]. It concludes that no hazard classification for its carcinogenicity is warranted. But males in all five mouse carcinogenicity studies considered by ECHA to be of acceptable quality show a statistically significant increase in the incidence of one or several tumor types. Importantly, the finding of an increased incidence of malignant lymphoma is further supported by the results of epidemiological studies indicating an association between glyphosate exposure and Non-Hodgkin lymphoma. This clearly exceeds the criteria for classification as a carcinogen as given in CLP Regulation, documented on page 95 of the Dossier[8].

US EPA: Glyphosate is currently undergoing a registration review by US EPA. The recently proposed classification by US EPA is that glyphosate is not likely to be carcinogenic at doses relevant for human health risk assessment[9]. However, this is based on some speculation, i.e. that the more positive epidemiological studies should have had lower relative risks than other studies; further, it is assumed that there were previous exposures in the greatly weighted AHS which has a rather short follow-up time. US EPA's interpretation that "the association between glyphosate exposure and the risk of NHL cannot be determined based on the available data" does not correctly characterize the human data presented. Findings on multiple myeloma that were included in the IARC evaluation were not considerered adequately.

The evaluation of the animal carcinogenicity data and mechanistic data for glyphosate missed important animal findings, but basically follows along the same lines as the EFSA/BFR review, suggesting a lack of independent review.

Conclusion

The glyphosate issue is just one example of inappropriate corporate influences on public health regulations by use of unsound scientific reviews. These economically motivated activities leave a resulting health burden on society. We call for increased sensitivity, full transparency and the implementation of effective rules governing decision making bodies[10].
We urge the Collegium Ramazzini to again support an IARC evaluation of carcinogenicity[11], since the most appropriate and scientifically based evaluation of the cancers reported in humans and laboratory animals as well as supportive mechanistic data is that glyphosate is a probable human carcinogen[1]. We suggest that common commercial formulations of GBHs should be prioritized for inclusion in government-led toxicology testing programs such as the U.S. National Toxicology Program, as well as for biomonitoring as conducted by the U.S. Centers for Disease Control and Prevention[12].

1 - http://tech.bmj.com/content/early/2016/03/03/jtech.2015.207005.full
2 - http://monographs.iarc.fr/ENG/Monographs/vol112/mono112-09.pdf
3 - European Food Safety Authority. Conclusion on the peer review of the pesticide risk assessment of the active substance glyphosate. EFSA J 2015;13:4302)
4 - http://registerofquestions.efsa.europa.eu/roqFrontend/outputLander?output=ON-4302
5 - http://corporateeurope.org/food-and-agriculture/2015/04/glyphosate-saga-independent-scientific-advice-according-germany-us
6 - https://www.theguardian.com/environment/2016/may/17/unwho-panel-in-conflict-of-interest-row-over-glyphosates-cancer-risk
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8 - http://www.pan-germany.org/download/PAN_Germany_-_Comment_on_CLH-Report_regarding_Carcinogenicity_1607.pdf
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11 - http://www.collegiumramazzini.org/download/12-SeventeenthORStatement(2015).pdf